CLAIMS

1. A method of obtaining an increased yield of biomass of a lactic acid bacterial cell culture, the yield exceeding that which can be obtained at maximum from substrate level phosphorylation, the method comprising the steps of

(i) providing in the cells of the culture conditions that results in a reduced glycolytic flux, and

(ii) providing conditions that enable the cells under aerobic conditions to have a respiratory metabolism.

2. A method according to claim 1 wherein the increased biomass is obtained by an increased yield of ATP in the cells.

3. A method according to claim 2 wherein the increased yield of ATP is obtained by activating the native ATP synthase activity or enhancing the expression of the ATP synthase of the cell.

4. A method according to claim 3 wherein the ATP synthase activity of the cells is activated by increasing the proton gradient of the cells and/or reducing the ATP/ADP ratio.

5. A method according to claim 4 wherein the reduced ATP/ADP ratio is provided by the reduced glycolytic flux in step (i).

6. A method according to claims 1 to 5 wherein the reduced glycolytic flux in the cells is provided by cultivating the culture under carbon source limiting conditions.

7. A method according to claim 6 wherein the carbon source limitation is provided by using a growth-limiting concentration of the carbon source.

8. A method according to claims 6 or 7 wherein the carbon source limitation is provided by cultivating the cells under fed batch and/or continuous conditions.

9. A method according to claim 6 wherein carbon source limiting conditions are provided by using a carbon source which is not readily metabolised by the cell.

10. A method according to claim 9 wherein the carbon source is selected from the group consisting of ribose, xylose, arabinose, allose, mannose, gulose, idose, galactose, talose and maltose.

11. A method according to claim 6 wherein the carbon source limiting conditions are provided by modifying the cells in order to assimilate the carbon source at a lower rate relative to its parent strain.

12. A method according to claim 3 to 11 wherein the increased yield of ATP is provided by increasing the expression of ATP synthase.

13. A method according to claim 12 wherein the expression of ATP synthase is increased by introducing in the cells an increased number of copies of a gene or genes expressing ATP synthase activity.

14. A method according to claim 12 wherein the expression of ATP synthase is increased by inserting a regulatory sequence that enhances expression or by reducing or inhibiting inhibition of the expression of ATP synthase.

15. A method according to any of claims 3-14 wherein the ATP synthase activity of the cells is activated by increasing the proton gradient of the cell.

16. A method according to claim 15 wherein the proton gradient is increased by increasing the expression of the native components of the electron transport chain.

17. A method according to claim 15 wherein the proton gradient is increased by increasing expression of NADH dehydrogenase or by reducing or eliminating the expression of a NAD^+ regenerating enzyme activity.

18. A method according to claim 17 wherein the NAD^+ regenerating enzyme activity is NADH oxidase activity.

19. A method according to claim 15 wherein the proton gradient is increased by increasing the expression of the endogenous cytochromes including cytochrome bd.

20. A method according to claim 15 wherein the proton gradient is increased by introducing a heterologous respiratory chain component.

21. A method according to claim 20 wherein the component is a cytochrome selected from the group consisting of cytochrome type bo, cytochrome type aa_3 and cytochrome complex cyt bc_1.

22. A method according to claims 1 to 21 wherein the conditions that enables the cell under aerobic conditions to have a respiratory metabolism are provided by cultivating the cells in a medium containing a quinone and/or a porphyrin compound or by cultivating the cells under conditions which favour the formation of a quinone, a porphyrin compound and/or a cytochrome.

23. A method according to any of claims 1-22 wherein the biomass comprises cells comprising a gene coding for a desired gene product.

24. A method according to claim 23 wherein the expression of the gene is under the control of an inducible or a constitutive promoter.

25. A method according to claim 23 wherein the desired gene product that is encoded is selected from the group consisting of an enzyme and a pharmaceutically active gene product.

26. A method according to claim 25 wherein the enzyme gene product is a milk clotting enzyme.

27. A method according to claims 1 to 26 wherein the cell is of a lactic acid bacterial species selected from the group consisting of a *Lactococcus* species, a *Streptococcus* species, a *Leuconostoc* species, a *Lactobacillus* species and an *Oenococcus* species.

28. A method according to any of claims 1-27 wherein the resulting cell biomass is a lactic acid bacterial food or feed starter culture.

29. A method of reducing the content of by-products in a production of biomass of lactic acid bacterial cells said method comprising of a step of increasing the yield of biomass by (i) providing in the cell conditions that results in a reduced glycolytic flux and (ii) providing conditions that enables the cell under aerobic conditions to have a respiratory metabolism.

30. A lactic acid bacterial cell obtainable by the method according to claims 1 to 28.

31. A lactic acid bacterial cell produced by culturing the cell under conditions that results in a reduced glycolytic flux, and under conditions that enable the cells to have, under aerobic conditions, a respiratory metabolism, said cell having, relative to a lactic acid bacterial cell produced in the presence of a readily metabolised carbon source in excess, an increased activity of the enzymes involved in the uptake and/or degradation of a that carbon source in which the bacterial cell has been propagated, and containing a detectable amount of a porphyrin compound and/or a cytochrome.

32. A lactic acid bacterial cell according to claim 31 which constitutively expresses the *lac* operon and/or *gal* operon.

33. A lactic acid bacterial cell according to claim 32 wherein constitutive expression is provided by a mutation in the gene coding for the *lac* repressor and/or *lac* operator.

34. A lactic acid bacterial cell according to claim 31 that contains at least 0.1 ppm on a dry matter basis of a porphyrin compound.

35. A lactic acid bacterial cell according to claim 31 that contains at least 0.1 ppm on a dry matter basis of a cytochrome.

36. A lactic acid bacterial cell according to claim 31 which is a cell of a lactic acid bacterial species selected from the group consisting of a *Lactococcus* species, a *Streptococcus* species, a *Leuconostoc* species, a *Lactobacillus* species and an *Oenococcus* species.

37. A starter culture composition comprising the lactic acid bacterial culture according to claim 1 or a lactic acid bacterial cell according to claims 30 or 31.

38. A composition according to claim 37 where the composition is in the form of a frozen, liquid or freeze-dried composition.

39. A composition according to claims 37 or 38 containing an amount of viable culturally modified lactic acid bacterial cells which is in the range of 10^4 to 10^{12} CFU per g.

40. A composition according to claims 37 to 39 that comprises cells of two or more different lactic acid bacterial strains.

41. A composition according to claims 37 to 40 which further comprises at least one component enhancing the viability of the bacterial cell during storage, including a bacterial nutrient and/or a cryoprotectant.